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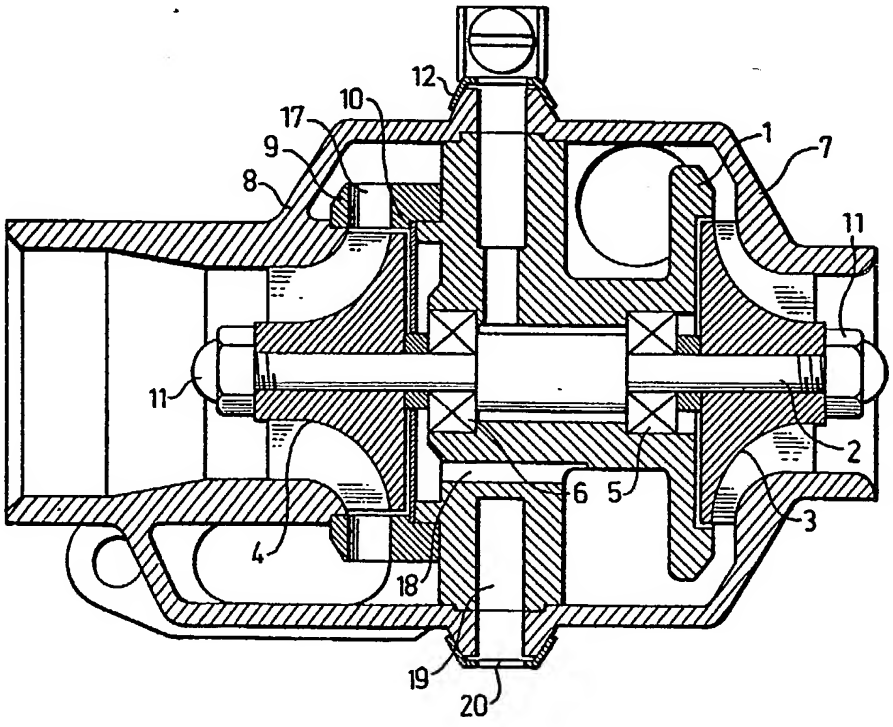
(57) Abstract

Device in turbo aggregates for internal combustion engines. A turbine (4) which is driven by the exhaust gases of the engine, is operably couled with an impeller (3) which supplies compressed air to the inlet side of the engine for producing additional pressure at the inlet for supercharge of the engine. Disposed over the inlet of the turbine (4) is a jet member, preferably in the shape of an exchangeable jet ring (9) by means of which the entrance area to the turbine (4) can be varied by insertion of different jet rings (9). In this way the aggregate becomes applicable to a plurality of different engine sizes and yet correct gas velocity and counterpressure in the turbine (4) be obtained for suitable conditions of operation in the turbo aggregate.



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DEVICE IN TURBO AGGREGATES

The present invention relates to a device in turbo aggregates for internal combustion engines in which a turbine driven by the exhaust gases of the engine is devised to drive an impeller for producing additional pressure at the inlet side of the engine for supercharge of the engine.

More recently it has become more and more usual to equip internal combustion engines with such turbo aggregates in order to increase the engine output or, as an alternative to get a desired output with a minor engine size. The known turbo aggregates have hitherto been constructed for a certain engine type and size, for which reason the use of turbo aggregates substantially has been restricted to engines which are manufactured recently in large series in order to obtain sufficiently satisfying production economy. Use of turbo aggregates in engines which are manufactured in varying sizes and in small series, such as model engines and other small type motors, has thus hitherto been impossible also due to the fact that known turbo aggregates had a complicated and expensive structure. Also the application to existing engines which already are in operation, has been impossible for the reasons stated above.

The main object of the present invention is to provide a turbo aggregate shaped so as to be capable of becoming adapted to a plurality of engine sizes in a very simple manner.

Another object of the invention is to provide a turbo aggregat having a very simple and uncomplicated construction and which, therefore, is cheap to manufacture and which, therefore, can be used for engines also where it because of the expenses was impossible to make use of the turbo effect.

These and other objects and advantages of the invention are obtained thereby that the turbo aggregate has been imparted the characteristic features stated in the

subsequent claims.

The invention will be described neafer in connection with the (attached) drawings. In that connection Fig. 1 shows a view from the turbine side of the turbo aggregate, Fig. 1b shows a longitudinal section through the turbo aggregate and Fig. 1c shows a view from the impeller side of the turbo aggregate. Fig. 2b shows a cross section through a jet ring which is used in the turbo aggregate according to Fig. 1, whereas Fig. 2b shows a section following the line 2b-2b in Fig. 2a. Figs. 3a and 3b show corresponding sections through another embodiment of the jet ring.

The so-called micro turbo according to the invention described henceforth comprises a central bearing housing 1 with bearing seatings for an impeller bearing 5 and a turbine bearing 6. Mounted in the bearings 5 and 6 is a shaft 2, which at its one end carries an impeller wheel 3 and at its other end a turbine wheel 4. The impeller wheel 3 and the turbine wheel 4 are kept in position on the threaded ends of the shaft 2 by nuts 11. The casing of the turbo aggregate consists of an impeller housing 7 mounted over the impeller wheel 3 and a turbine housing 8 located over the turbine wheel 4. The impeller housing 7 and the turbine housing 8 are at their ends opposing each other provided with bevels which fit corresponding bevels on the bearing part or bearing housing 1, and the three parts, viz. the bearing housing, the impeller housing 7 and the turbine housing 8 are held together by means of a chuck member 12 which has U-shape and the oblique shanks of which fit over corresponding oblique bevelled surfaces on the impeller housing 7 and the turbine housing 8 so that the chuck members 12 when their ends are forced together by means of a screw 13 and a nut 14 clamp the impeller housing 7 and the turbine housing 8 against the bevels on the central bearing housing 1. From the figures 1a and 1c the inlet connection piece 15 to the turbine housing 8 and the outlet connection piece 16 from the impeller housing 7 are evident also.

The turbo aggregate is driven in usual manner thereby

that the exhaust gases from an internal combustion engine, in the assumed case a model motor or other minor engine, via the inlet connection piece 15 are supplied to the turbine wheel 4 and drive the same, the turbine wheel then over the shaft 2 also driving the impeller which produces the necessary overpressure on the inlet side of the internal combustion engine through the compressed combustion air which is supplied to the engine from the impeller housing 7 through the exhaust connection pieces 16. In this construction the exhaust diffuser of the impeller is integrated with the bearing housing 1 in such a manner that the air passing therethrough cools the bearing housing and carries away that heat which is introduced from the turbine side in the bearing units of the engine.

In order to render possible to adapt the turbo aggregate to different engine sizes so as to obtain desired gas speed in the exhaust gases which are supplied to the turbine wheel 4 and the required back pressure be developed in the turbine, there is installed a jet ring 9 with a number of inlet holes 17 distributed around the ring and adapted to the size of the engine. Disposed between the inserted jet ring 9 and the bearing housing 1 is a grommet 10 which constitutes a seal between the turbine wheel 4 and the shaft bearings 5 and 6 of the shaft 2. Blocking air to this seal is obtained from the outlet diffuser of the impeller via an aperture 18 in the bearing housing 1.

In the figures 2a and 2b the jet ring 9 is shown in nearer detail, from which it becomes evident that the inlet holes 17 to the turbine wheel 4 are directed slightly tangentially towards said wheel 4. The figures 3a and 3b show another design of the jet ring, here denoted 9b, where the inlet holes 17b extend from the end surface of the jet ring 9b and have rounded inled edges. Of course, other designs of the jet ring 9 are conceivable with different number of inlet holes 17 and other shape of the same.

The turbo aggregate is intended to be mounted directly on the outlet flange of the engine, a suitable adapter being mounted between the outlet flange of the engine and

connection piece 16 is attached to the carburator inlet of the engine, suitably by means of a flexible hose. Upon start of the engine, its exhaust gases will flow through the holes 17 in the jet ring 9 and set the turbine wheel to run. Hereby the turbine wheel 4 drives via the shaft 2 the impeller wheel in such a manner that air under super-pressure is supplied to the inlet side of the engine which results in a supercharge effect for the engine.

For the purpose of cooling of the bearing part and preventing the heat from the turbine from being conducted to the impeller part, the bearing part 1 may have a central, circumferentially extending groove 19, and the chuck member have several apertures 20 which connect the groove 19 with the surrounding atmosphere. Of course, other designs of the bearing housing 1 for producing this cooling effect are conceivable also.

From the preceding description it is evident that a turbo aggregate has been created which in a very simple manner by exchange only of the jet ring 9 can be adapted to a plurality of engine sizes. Some reduction of the efficiency may occur, but this is more than well compensated by the advantages of rendering possible to series-produce one sole turbo aggregate for several engine sizes. The shown embodiment which is especially suitable for model engines and other similar small type motors, is very easy to produce and to instal, since all stationary parts in the engine, such as the bearing housing 1, impeller housing 7, turbine housing 8, jet ring 9 and grommet 10 are kept together by means only of a chuck member 12 and screw 13 and nut 14. However, it shall stand clear that the invention is applicable also to turbo aggregates for larger engines, the turbo agggregate then possibly be imparted other structure and design.

CLAIMS

1. Device in turbo aggregates for internal combustion engines, in which a turbine (4) driven by the exhaust gases of the engine is devised to drive an impeller (3) for producing additional pressure at the inlet side of the engine for supercharge of the engine, characterized by a jet member (9) arranged over the inlet to the turbine (4) by means of which the entrance area to the turbine is variable for obtaining a predetermined gas velocity and a predetermined counterpressure in the turbine part (4) of the turbo aggregate.

2. Device according to claim 1, characterized in that the jet member (9) is devised exchangeable and that the entrance area is determined by openings (17) of predetermined number and magnitude in the jet member (9).

3. Device according to claims 1 or 2, wherein the entrance to the turbine comprises a slot which extends over at least a part of a circular entrance portion of a housing in which the turbine (4) is mounted in bearings, characterized in that the jet member (9) has the shape of a jet ring which surrounds the circular entrance portion and which has a plurality of holes (17) evenly distributed over the entrance slot.

4. Device according to any of the claims 1-3, characterized by a central bearing part (1), within which a trough shaft (2) is mounted in bearings and which on either side of the bearing parts (1) carries a turbine wheel (4) and an impeller wheel (3), which are surrounded by, respectively, a turbine housing (8) and an impeller housing (7), which housings abut against the bearing part (1) and are kept secured thereto by means of chuck members (12, 13, 14).

5. Device according to claim 4, characterized in that the turbine housing (8) and the impeller housing (7) are formed with projecting flanges facing each other and kept together by means of a U-shaped chuck member (12) which grasps over said flanges and forces them

together with the bearing part (1) located therebetween.

6. Device according to claims 4 and 5, c h a r a c t e r i z e d in that the jet member (9) is kept fixed between the turbine housing (8) and the bearing part (1).

7. Device according to any of the claims 1-6, c h a r a c t e r i z e d in that the holes (17) of the jet member are directed tangentially to the turbine (4).

8. Device according to any of the claims 1-7, c h a r a c t e r i z e d in that the outlet diffuser of the impeller (3) has connection with the bearing part (1) in such a manner that a portion of the impeller air cools the bearing housing and removes heat from the turbine part (4).

9. Device according to any of the claims 4-8, c h a r a c t e r i z e d by a grommet (10) disposed between the turbine (4) and the bearing part (1) and forming a seal between the turbine (4) and the bearing part (1).

10. Device according to claim 9, c h a r a c t e r i z e d in that a duct (18) connects the outlet diffuser of the impeller (3) with a space between the bearing part (1) and the grommet (10).

Fig.1a

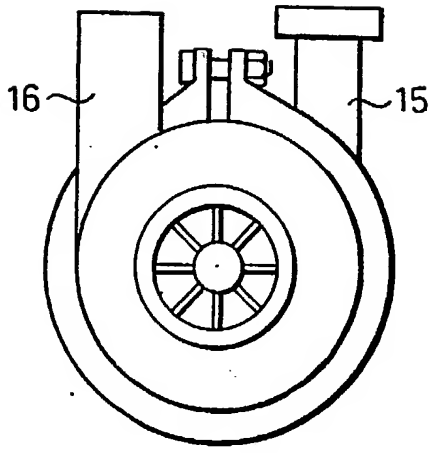


Fig.1c

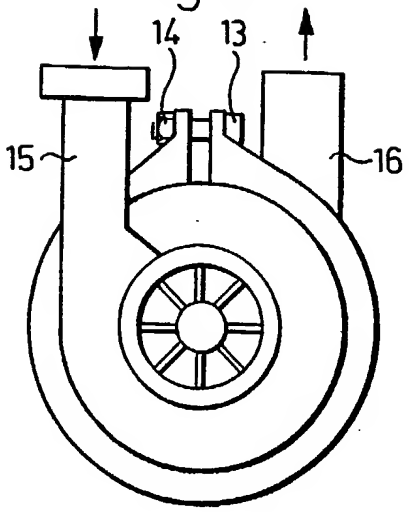


Fig.1b

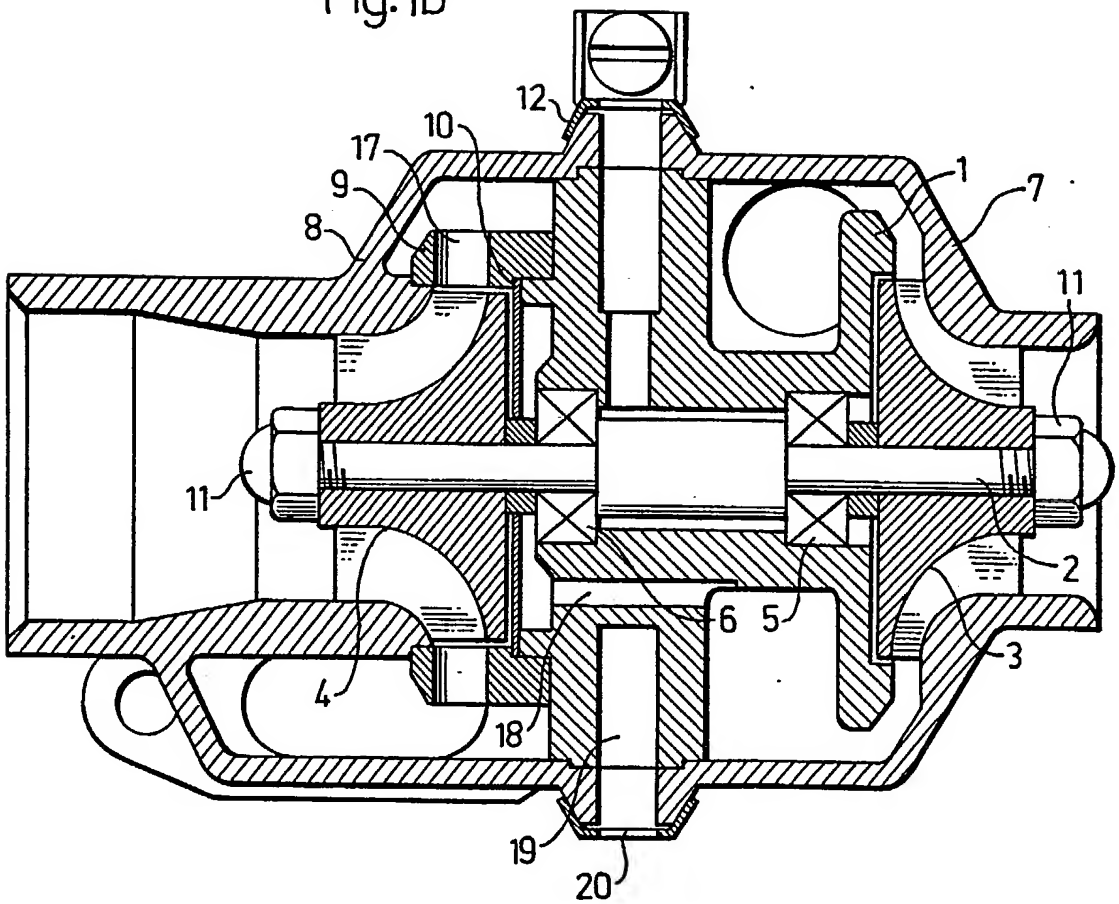


Fig. 2a

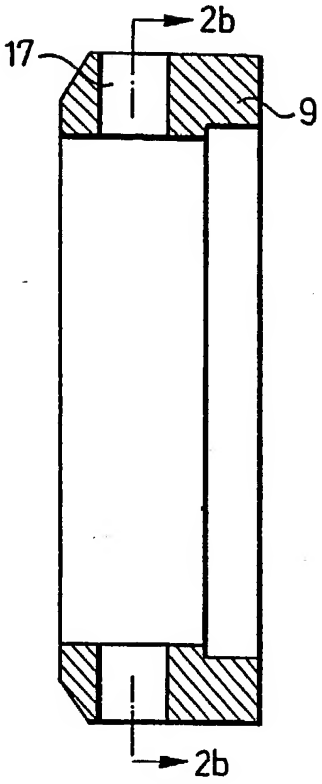


Fig. 2b

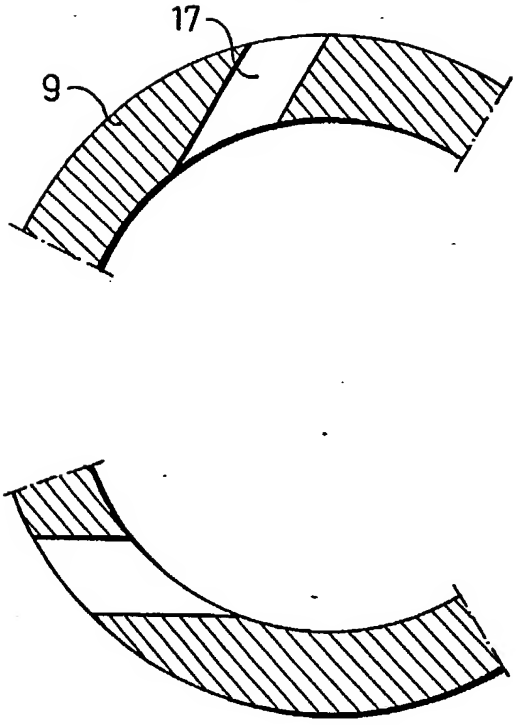


Fig. 3a

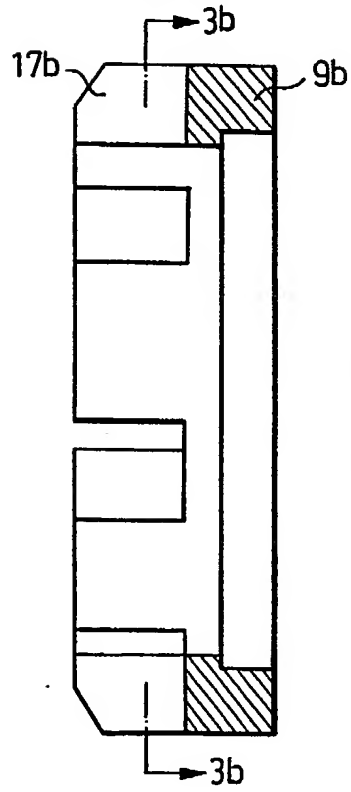
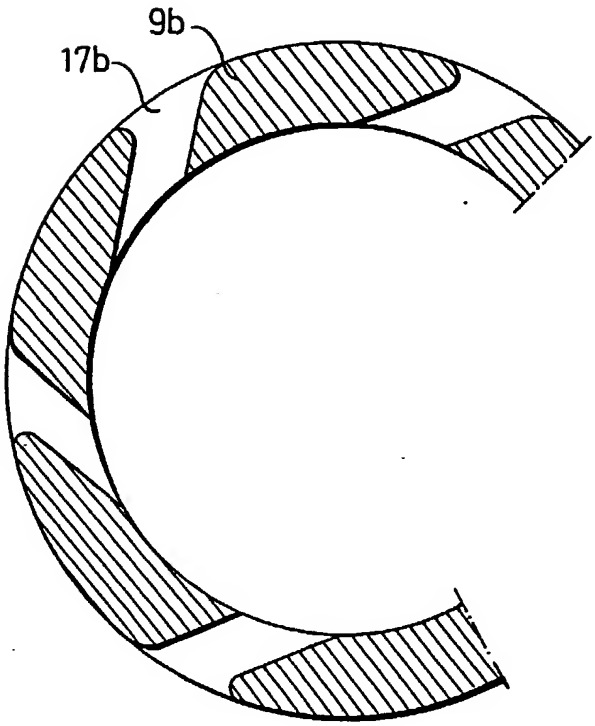


Fig. 3b



INTERNATIONAL SEARCH REPORT

International Application No PCT/SE86/00207

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [9]

According to International Patent Classification (IPC) or to both National Classification and IPC [4]

F 02 B 37/00

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
IPC 4	F 02 B 33/44, 37/00, /02
US Cl	123: 65-73; 60: 597-606

Documentation Searched other than Minimum Documentation to the Extent that such Documents are included in the Fields Searched [8]

SE, NO, DK, FI classes as above

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category *	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
A	DE, A1, 304 388 (CHR LORENZEN) 6 April 1917	
A	US, A1, 2 547 327 (A S KING) 3 April 1951	
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